



# FKMCD-Oxitec Public Educational Webinar

Environmental Health and Oxitec: Benefits for the Florida Keys' Sensitive Ecosystem and Endangered Species

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# Introductions – Panelists With You Today



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FKMCD and Oxitec are hosting a series of public educational webinars to share information with residents of the Florida Keys and provide forums to answer questions.

- All webinars are open to everyone
- All webinars are recorded and made available for everyone after the event
- All questions will be answered (some in batches if questions are similar)
- If time runs out, we will accept questions in writing via [florida@oxitec.com](mailto:florida@oxitec.com)
- Questions and answers will be published in writing after the event with external or related online resources/references

## Upcoming:

1. **Human Health and Oxitec:** The Safety of Oxitec Technology – coming in October!
2. **Virtual Tour: Inside Oxitec Labs** – coming in November! *Meet the team that produces mosquitoes for the project and see inside one of Oxitec's production facilities in a virtual tour.*
3. **What's in the Box?: How Oxitec's Just-Add-Water Technology Helps Control the *Aedes aegypti* Population** – coming in December!

## Welcome to webinar #1 in this 7-part series!

### Today's Agenda:

- Why now? Health, economy and the environment.
- The spread of the invasive, disease-carrying *Aedes aegypti* mosquito.
- Insecticide resistance.
- Benefits of Oxitec's targeted biological control solution.
- Regulatory findings.
- Your questions, answered.

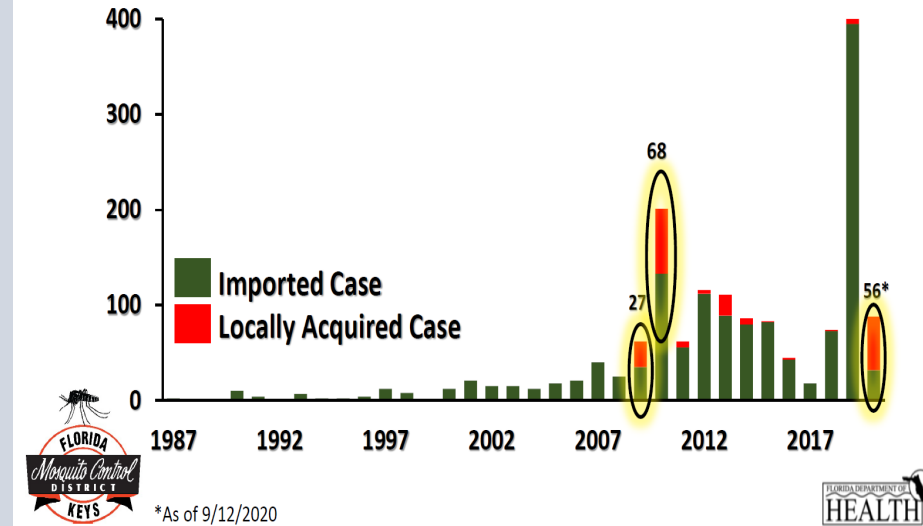


# Why now? – Health, Economy, and the Environment



- Dengue is an ongoing challenge with over 50 confirmed locally-acquired cases in Monroe County so far in 2020
- The threat of other diseases such as Zika, chikungunya and yellow fever persists
- Insecticide resistance in local mosquitoes
- Need more tools in our toolbox

### Dengue Cases in Florida Since 1987



- Environmental impact is a major consideration
- Using species-specific tools minimizes environmental impact
- Nine national and state agencies concluded Oxitec male mosquitoes pose no risk to environmental health



Photo: Jaret Daniels

Endangered Schaus' swallowtail butterfly lives where the current dengue outbreak is.

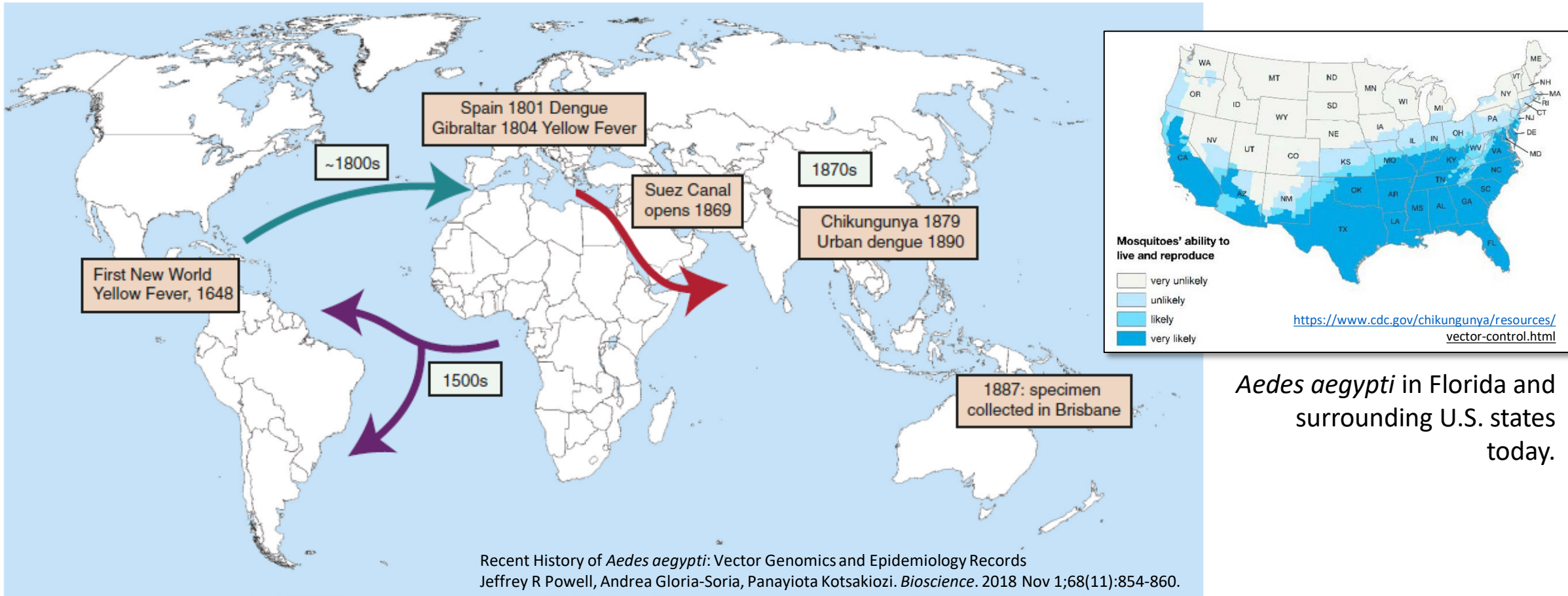




# The *Aedes aegypti* Mosquito: an Invasive Species in Florida



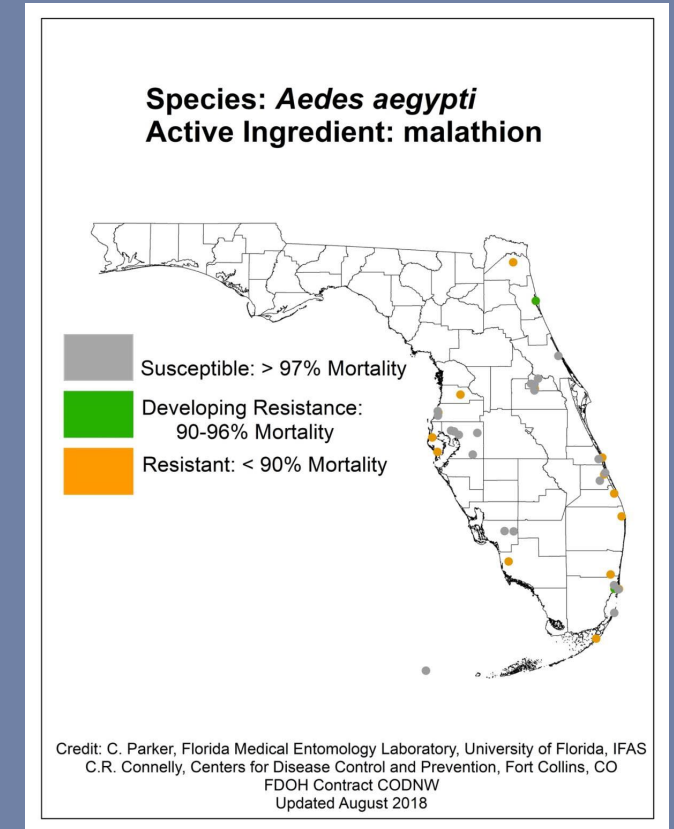
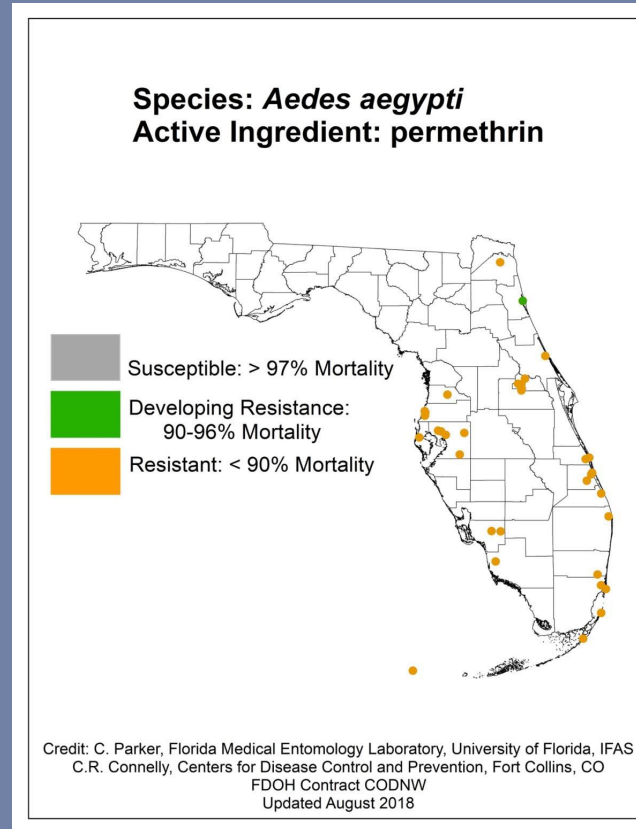
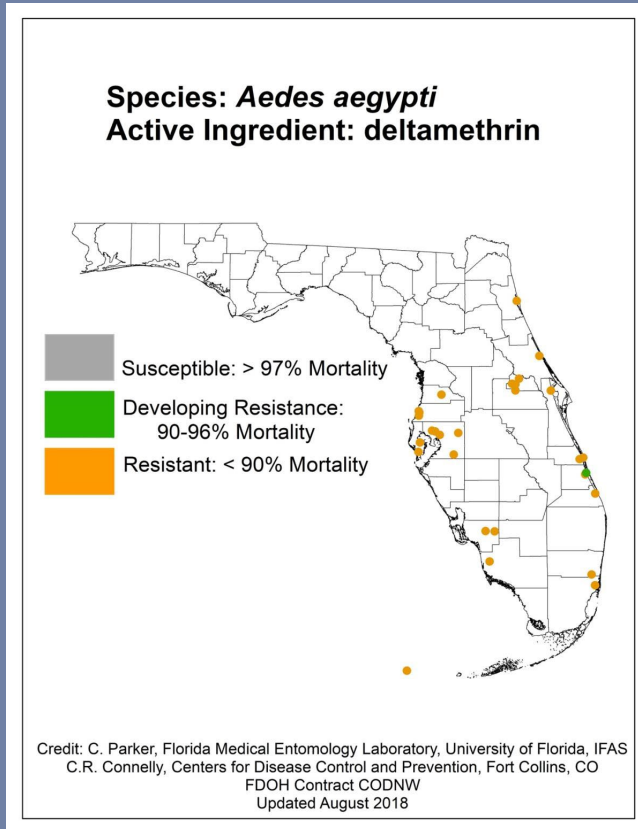
***Aedes aegypti* is not native to the Americas.** It was most likely transported from Africa by Portuguese ships sometime in the 16<sup>th</sup> century.



*Aedes aegypti* in Florida and surrounding U.S. states today.

# Wild *Aedes aegypti* Mosquitoes: Becoming Resistant To Insecticides

Chemical insecticide resistance is a major challenge for *Aedes aegypti* control in the United States. Resistance could worsen, which means new tools need to be developed proactively now.



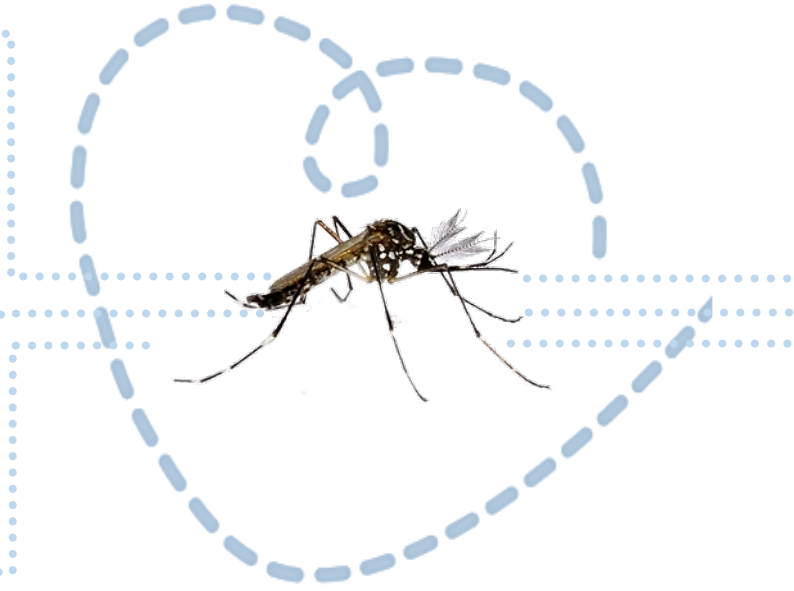
\*Final Report: Florida Department of Health Contract CODNW. Updated distribution and insecticide susceptibility status of container mosquitoes in Florida, 14 Aug 2018.

## OXITEC'S *Aedes Aegypti*

✓ TARGETED SUPPRESSION

✓ SAFE, NON-TOXIC, NON-ALLERGENIC

✓ PROVEN EFFECTIVENESS



MALE-ONLY RELEASES  
(male mosquitoes do not bite)

TRACEABLE IN THE FIELD

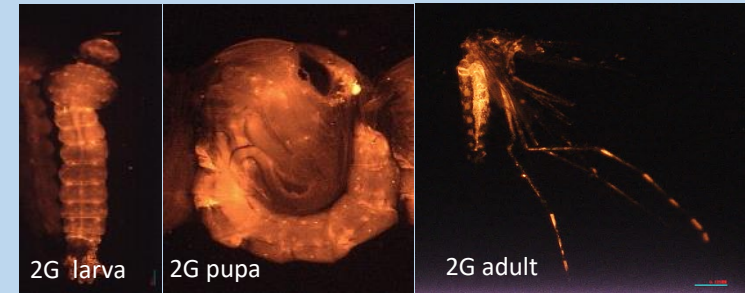
SELF-LIMITING IN THE ENVIRONMENT



- No females produced
- Low-tech, egg-based devices enabled



- Easy track-and-trace in the field
- Non-toxic, non-allergenic







# Environmental Benefit - Sustainability



- **OX5034 is a biological mating-based tool - there are no chemicals.**
- **OX5034 is not prone to resistance development.**
- **OX5034 can be integrated with other tools, maintaining effectiveness through a multi-faceted approach.**



- Integrated Vector Management (IVM)
- Reducing reliance on insecticides
- Innovative tools
- OX5034 has the potential to reduce insecticide resistance





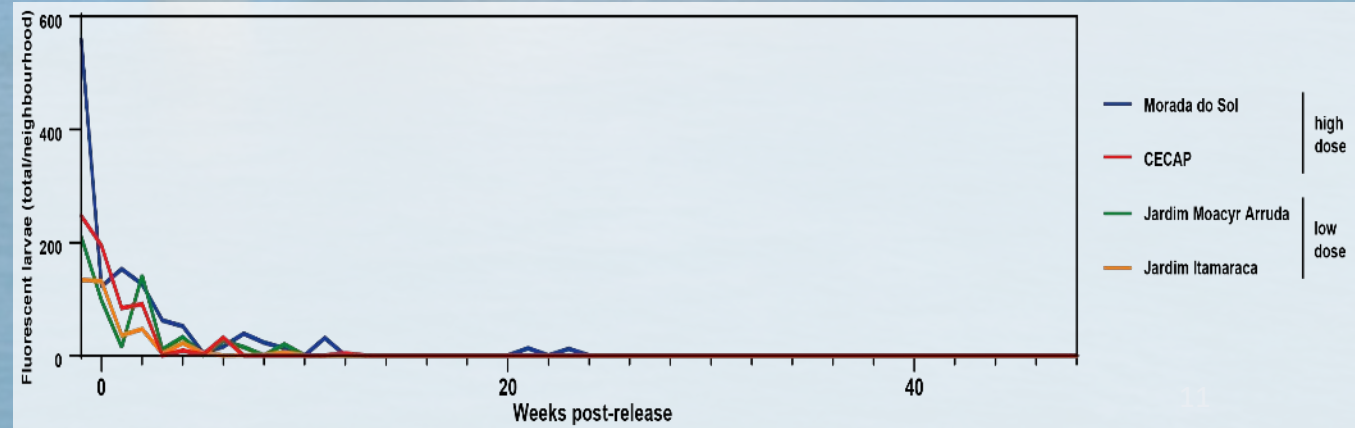


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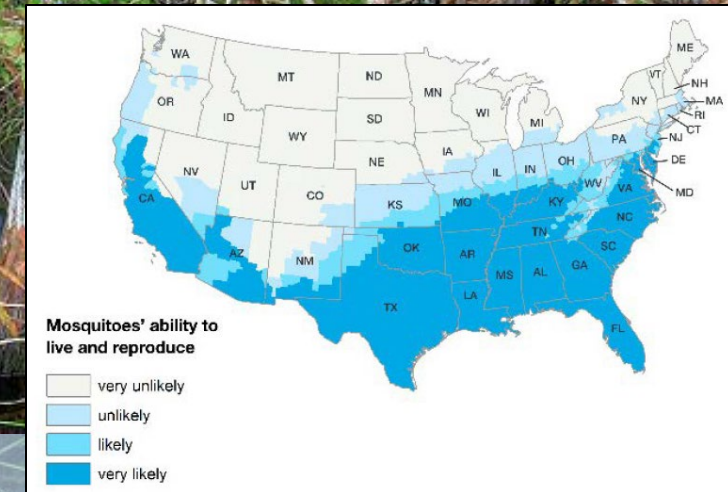
# Environmental Benefit - No Ecological Footprint



- No direct nor indirect effects on other animals, humans or the environment.
- The introduced genes cannot persist, and disappear within a few generations.
- Over 1 billion Oxitec mosquitoes released over the past decade with no negative impact.







- Native ecology in the US does not include *Aedes aegypti*, which is an invasive species.
- As an invasive species, *Aedes aegypti* has the potential to impact and maybe even displace native biodiversity.
- OX5034 mosquitoes are designed to control *Aedes aegypti* while protecting native species.





# The Florida Keys' Sensitive Ecosystem



## Protected Species in the Florida Keys (excluding plants and fish)

### Birds:

- Everglade snail kite
- Cape Sable seaside sparrow
- Wood stork
- Audubon's crested caracara
- Piping plover
- Roseate tern
- Red knot
- Florida grasshopper sparrow
- Florida scrub-jay

### Mammals:

- Key deer
- Florida panther
- Silver rice rat
- Key Largo cotton mouse
- Key Largo woodrat
- Lower Keys marsh rabbit
- Puma
- Florida bonneted bat

### Reptiles, Insects and Molluscs:

- American alligator
- Hawksbill sea turtle
- Leatherback sea turtle
- Loggerhead sea turtle
- Eastern indigo snake
- American crocodile
- Gopher tortoise
- Schaus' swallowtail butterfly
- Miami blue butterfly
- Bartram's hairstreak butterfly
- Florida leafwing butterfly
- Stock Island tree snail



**Independently validated**: no effects on endangered species or critical habitat, whether direct (e.g. in diet) or indirect (if *Aedes aegypti* population reduced).

SAFE FOR

- Fish
- Birds
- Mammals
- Plants
- Invertebrates
- Reptiles
- Other aquatic animals



*'Aedes aegypti is a negligible part of bird, amphibian or bat diets'*

*'OX5034 male mosquitoes cannot bite people or wildlife'*

- For example, experiments by third-party independent labs showed that **freshwater fish** and **invertebrates** consuming a diet of 70% OX5034 mosquito larvae fared no differently from fish and invertebrates fed 70% non-GM mosquito larvae.





## Topic

## EPA's Response

- |   |  |  |
|---|--|--|
| ☐ Tetracycline                            | ✓ <i>“negligible risk that testing of OX5034 mosquitoes would spread antibiotic resistant bacteria in the US environment”</i>  | (p75-76, Response to Comments)                             |
| ☐ Off-target Impacts                      | ✓ <i>“no adverse effects are anticipated for nontarget organisms as a result of the experimental permit to release OX5034 mosquitoes”</i>  | (p 49, EPA Human Health and Environmental Risk Assessment) |
| ☐ Endangered Species                      | ✓ <i>“a 'No Effect' determination is also made for direct and indirect effects to federally listed endangered and threatened species, and for their designated critical habitats”</i>                                  | (p 49, EPA Human Health and Environmental Risk Assessment) |
| ☐ GM mosquito survival in the environment | ✓ <i>“introgression of OX5034 strain genetics into the local wild Ae. aegypti mosquito population is likely to occur during releases of OX5034; however, the risk resulting from such introgression is negligible”</i> | (p134, Response to Comments)                               |



# State of Florida Departments/Bureaus Unanimously Approved Permit



### EUP Approved By:

- ✓ Florida Department of Agriculture and Consumer Services
- ✓ Florida Department of Environmental Protection (FDEP)
- ✓ Florida Fish and Wildlife Conservation Commission (FWC)
- ✓ Bureau of Inspection and Incident Response (BIIR)
- ✓ Florida Department of Health (DOH)
- ✓ Bureau of Agricultural Environmental Laboratories (BAEL)
- ✓ Bureau of Chemical Residue Laboratories (BCRL)
- ✓ Bureau of Scientific Evaluation and Technical Assistance, Scientific Evaluation Section (SES)



# Summary

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- An increasing threat is evident, disease cases increase with reducing options for management.
- OX5034 non-biting male mosquitoes are highly targeted, ensuring absolutely minimal impact on any other species or the wider environment.
- While locally-found wild *Aedes aegypti* are increasingly resistant to insecticides, OX5034 male mosquitoes have the potential to reduce reliance on insecticides for *Aedes aegypti* control.
- Protecting against a dangerous invasive species may promote native biodiversity.
- Sustainability requires long-term performance with no long-term impact on the environment, OX5034 holds the potential to provide that.





# Question and Answers



**Any and all questions on this evening's topics are welcome!**

*(If we run out of time tonight, email [florida@oxitec.com](mailto:florida@oxitec.com) and we will attempt to answer your question if it isn't included in the growing FAQ or post-event summary we publish online at [oxitec.com/florida](https://oxitec.com/florida))*



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# Conclusion



## THANK YOU!

A summary of this event, as well as more Q&As, resources, facts, and background materials are available at [www.oxitec.com/florida](http://www.oxitec.com/florida).